46. (new) A composite metallic ultrafine particle, comprising:

a core metal made of a metal; and

an organic compound covering a surface of the core metal;

wherein a diameter of the particle is in the range of 1 to 100 nm, and

the particle is obtained by

mixing a metallic salt, a metallic oxide, or a metallic hydroxide having the metal with the organic compound and adding a reducing agent.

REMARKS

The Official Action of April 22, 2002, Paper No. 7, and the prior art relied upon therein have been carefully reviewed. The claims in the application are now claims 1-46, and these claims define patentable subject matter warranting their allowance. Accordingly, the applicants respectfully request favorable reconsideration and allowance.

Briefly, the present invention relates to a unique metallic ultrafine particle and method for its manufacture. The method involves reacting two distinct components, namely a source for the metallic core (i.e. a metallic salt, a metallic oxide or a metallic hydroxide) and a separate source for an

organic compound coating which covers the core metal. The resultant particle is in part characterized by the method, and as a result of the method has certain unique aspects or characteristics. One of these is that the coating is bonded to the core by virtue of the aforementioned reaction. Moreover, in a more general way, the nature of the particle may be varied by selection of different reagents, and in different quantities.

Acknowledgement by the PTO of the receipt of applicants' papers filed under §119 is noted.

Claims 1, 3-5, 7 and 8 have been rejected on the basis of obviousness-type double patenting over claims 1-4 and 6 of Nagasawa et al USP 6,358,611. This rejection is respectfully traversed.

Claim 1 has been amended to more clearly bring out what is already in other claims, including claims 5, 7 and 8, namely that the present invention involves, as indicated above, a process involving reacting distinct components and (insofar as claims 1, 3 and 4 are concerned) the resultant product, i.e. a product which is characterized by what is

inherently achieved by such reaction, which is quite different from the reaction which is carried out in Nagasawa.

Applicants will discuss the disclosure of Nagasawa below, but for the double patenting rejection it is only the claims of Nagasawa which must be considered. The rejection is based on claims 1-4 of Nagasawa, but there is nothing in these four claims (or indeed all six claims) of Nagasawa which would have made obvious to the person of ordinary skill in the art the process of applicants' claims 5, 7, and 8 which involves "mixing" a metallic precursor "with an organic compound" precursor of the resultant organic coating over the resultant metallic core.

With respect to applicants' claims 1, 3 and 4, applicants respectfully rely on *In re Luck et al, supra*, and respectfully point out that applicants' claimed product is inherently different and nonobvious from claims 1-3 of Nagasawa.

Applicants respectfully request withdrawal of the double patenting rejection.

Insofar as the product is concerned, applicants do not rely on the fact that the process distinguishes over the process of Nagasawa, but applicants do rely on the differences which are imposed on the respective products by the differences in the process, applicants in this regard relying on *In re Luck et al,* 177 USPQ 523, 525 (CCPA, 1973), where the court stated in part: "As for the method..., it is well established that product claims may include process steps to wholly or partially define the claimed product. [citation omitted] To the extent these process limitations distinguish the ***product*** over the prior art, they must be given the same consideration as traditional product characteristics." (emphasis in original)

Claims 1, 3-5, 7 and 8 have been rejected under §102 as anticipated by the PCT publication of Nagasawa, i.e. WO98/26889 A1 published June 25, 1998, the USP 6,358,611 in the name of Nagasawa et al (hereinafter simply "Nagasawa") being relied upon as a translation of the international publication. This rejection is respectfully traversed.

As indicated above, a novel feature of the present invention resides in the particular process for the production of composite metallic ultrafine particles which, as recited in claim 5, comprises mixing a metal source compound (metallic salt, metallic oxide or metallic hydroxide) with an organic compound (including a functional group having chemisorption capability onto the surface of a core metal produced from the metal source compound), and heating the mixture for reaction.

The particular process provides composite metallic ultrafine particles which comprise a core metal (derived from the metal source compound), and the organic compound covering the core metal (see e.g. claim 1). Thus, according to the present invention, the core metal and the protective coating of organic component are derived from the two distinct compounds. This brings about differences which result in various advantages as described on page 3, line 22 to page 4, line 4 of the present specification.

Turning now to Nagasawa, it discloses a process for producing composite metallic ultrafine particles, comprising heating a metal organic compound, such as a metal salt of a C... fatty acid, in an inert gas atmosphere at a temperature but less than the decomposition temperature of the metal organic compound (see claim 4). The process provides ultrafine particles comprising a metal core derived from the metal organic compound, covered with an organic component derived from the metal organic compound (see Fig. 1 and the description at col. 2, line 64 to col. 3, line 19 of the reference).

Thus, according to Nagasawa, a single starting material (metal organic compound) is used to provide ultrafine particles comprising a core metal and a protective coating of organic component, both derived from the single starting material. This is clearly distinct from the present invention as instantly claimed which employs the different starting materials, i.e. the metal source compound and the organic compound including a functional group, respectively for providing the core metal and the protective coating of the resulting composite metallic ultrafine particles.

Nagasawa nowhere teaches or suggests the concept of the present invention of mixing the two distinct starting materials (the metal salt, oxide or hydroxide) and the organic

compound including a functional group and heating the mixture for reaction, thereby providing composite metallic ultrafine particles comprising a metal core and a protective coating of organic component derived from the respective starting materials.

Accordingly, it should be clear that Nagasawa does not anticipate any of applicants' claims, including claims 1, 3-5, 7 and 8, or the newly added claims which are patentable for the same reason. Applicants accordingly respectfully request withdrawal of the rejection based on Nagasawa.

Claims 1-18 have been rejected under §102 as anticipated by Tomihisa et al USP 5,683,501 (Tomihisa). This rejection is respectfully traversed.

Applicants' product and process have been described above. Tomihisa discloses something quite different, as noted below, and therefore Tomihisa does not anticipate any of applicants' claims.

In this regard, Tomihisa discloses and teaches the provision of an **oxide** core, e.g. a metal oxide or silica, most particularly silica. The metal oxide is defined in the reference as "an oxygen-containing metallic compound in which a metal element mainly constitutes a three-dimensional network through bonding with an oxygen atom" (col. 6, lines 14-17). The compound fine particles of Tomihisa are thus clearly

differentiated from the composite metallic ultrafine particles instantly claimed in which the core is composed of a metal as a single substance.

Since the compound fine particles and the production process disclosed in Tomihisa are thus fundamentally differentiated from the composite metallic ultrafine particles and the production process as instantly claimed in claims 1-18 and the new claims, the anticipation rejection of these claims based on the reference is considered to be incorrect.

Applicants respectfully request withdrawal of the rejection.

Claims 19-30 have been rejected as anticipated under §102 by Prasad et al USP 5,912, 257 (Prasad). This rejection is respectfully traversed.

With respect, the applicants are hard pressed to understand this rejection. In applicants' view, and after having carefully studied Prasad, it appears to applicants that Prasad is related to entirely different subject matter than applicants' invention.

More particularly, Prasad appears to be related to the manufacture of styryl dyes. The Prasad disclosure is quite lengthy, running 112 columns including the claims. In addition to the styryl dyes *per se*, the claims include compositions thereof and porous glass-polymer composites, as

well as methods for using the dyes, compositions and composites.

The rejection refers first to column 17, lines 1-34 which relates to a part of the structure of the dyes *per se*. The rejection also refers to column 59, line 49, through column 60, line 17, which relates to a portion of a method for incorporating the styryl dye in a film comprising lipids. Applicants do not see that these disclosures having anything to do with the present invention.

The rejection also refers to column 35, lines 21-59. This text relates to part of the Prasad disclosure having to do with the preparation of a thermoset polyester resin. Going back to column 26, lines 42 *et seq*, the lengthy discussion of polymers, including the thermoset polyester resin, appears to be as a matrix material in which the styryl dye is dispersed. Applicants do not see that this subject matter has anything to do with the present invention.

The rejection further refers to column 22, lines 20-65 and column 26, lines 24 *et seq*. The latter disclosure again has to do with the dispersion of the styryl dyes in various matrices. The disclosure at column 22 is simply part of the disclosure relating to the manufacture of the styryl compounds. These disclosures having nothing to do with the present invention.

Next, the rejection refers to column 30, lines 24-32, and column 32, line 57 through column 33, line 39. These disclosures are part of the lengthy description as regards the various possibilities of polymeric matrices in which the styryl dyes may be dispersed, and again applicants fail to see what this subject matter has to do with the present invention.

Lastly, the rejection refers to "all Prasad claims". The Prasad patent contains 80 claims, appearing at columns 99 through 112. Claims 1-5 are directed to styryl compounds. Claims 6-22 are directed to compositions including the styryl compounds, including certain matrix materials. Claims 23-79 relate to methods. Claim 80 relates to a laser. With respect, applicants do not see how any of these claims relate to the present invention.

Applicants respectfully request withdrawal of the rejection.

Claims 31-36 have been rejected under §102 as anticipated by Nakaura et al USP 6,139, 591 (Nakaura). This rejection is respectfully traversed.

Applicants' claims 31-36 are directed to an apparatus designed and constructed to carry out applicants' claimed process as described above. The functions of the apparatus as recited in these claims are part of applicants'

claimed subject matter "as a whole" and should not be brushed aside.

For example, claim 31 does not recite any "dispersion liquid supply device... for dispensing a dispersed liquid" which may possibly be a slurry, which the rejection says is shown by Nakaura, but applicants' claimed device comprises "a dispersion liquid supply device for supplying a dispersion liquid of composite metallic ultrafine particles to a surface of a substrate, said dispersion liquid of composite metallic ultrafine particles being prepared by dispersion... said composite metallic utlrafine particles in which a surface of a core metal is covered with a organic compound including a functional group having chemisorption capability onto the surface of said core metal". Respectfully, the PTO should not brush aside or ignore recitations which appear in applicants' claims.

As is apparent from the full text of Nakaura, what is taught in the reference is a wafer separation and cleaning device, which is not relevant to an apparatus for forming an interconnection as instantly claimed. Since Nakaura thus fails to teach an interconnection-forming apparatus as instantly claimed, the §102(e) rejection of the present claims 31-36 based on the reference is respectfully submitted to be incorrect.

Applicants respectfully request withdrawal of the rejection.

Claims 31-40 have been rejected as obvious under §103 from Danese in view of Van Buskirk. This rejection is respectfully traversed.

The Danese reference teaches a method and apparatus for processing a substrate with ultraviolet light. The processing is specifically etching, photoresist stripping, oxide removal, or cleaning (claim 11). Thus, the Danese reference does not teach or suggest a method and apparatus for forming an interconnection, let alone the method and apparatus instantly claimed which forms an interconnection in the specific manner utilizing the particular dispersion of composite metallic ultrafine particles.

Van Buskirk has not been cited to make up for the aforementioned deficiencies of Danese and indeed does not do so. Therefore, even if the combination were obvious, the reconstruction provided by such a combination would not correspond with applicants' claims. Consequently, even if the combination were obvious, applicants' claims would not be obvious. Thus, applicants believe that no detailed discussion of Van Buskirk is necessary.

Nevertheless, the portions of Van Buskirk relied upon in the rejection teach CMP (chemical mechanical

polishing) using a metal oxide, such as silica, as an abrasive. Such teaching has no connection with the supply of the present dispersion of composite ultrafine metal particles which, after the later heating and polishing, provides an interconnection.

Withdrawal of the rejection is in order and is respectfully requested.

As regards the newly added claims, these are patentable for the reasons pointed out above.

The prior art documents made of record and not relied upon have been noted, along with the implication that such documents are deemed by the PTO to be insufficiently pertinent to warrant their application against any of applicants' claims.

Applicants respectfully request favorable reconsideration and allowance.

Respectfully submitted,

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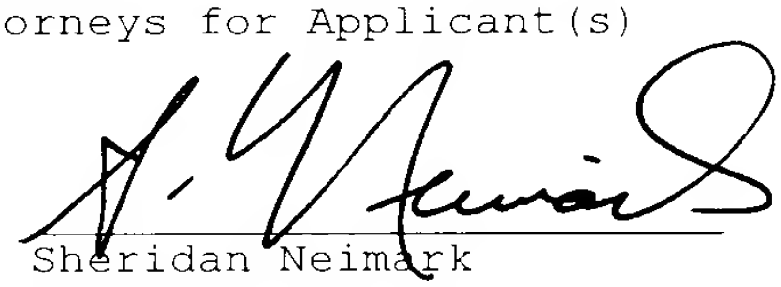
By 
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Version with Markings to Show Changes Made

1. (amended) A composite metallic ultrafine particle characterized in that

a surface of a core metal produced from a metallic salt, a metallic oxide, or a metallic hydroxide and having a particle diameter of 1 to 100 nm is covered with an organic compound including a functional group having chemisorption capability onto said surface of said core metal., and

that said particle is a reaction product of the metallic salt, the metallic oxide, or the metallic hydroxide with the organic compound.

13. (amended) A composite metallic ultrafine particle having a structure in which a periphery of core metal having a diameter of 1 to 100 nm is surrounded by an organic compound including an alcoholic hydroxyl group, and that said particle is obtained by heating an organic compound including an alcoholic hydroxyl group and a metallic salt as a metal source at a temperature that is not more than a decomposition initiation temperature of said organic compound including an alcoholic hydroxyl group and is not less than a decomposition temperature of said metallic salt.